

Claims

[c1] What is claimed is:

1. An isolated nucleic acid molecule comprising a nucleotide sequence encoding an antifungal polypeptide having an amino acid sequence as set forth in SEQ ID NO:4.

[c2] 2. An isolated nucleic acid molecule having a nucleotide sequence selected from the group consisting of:

a) the nucleotide sequence of SEQ ID NO:3;
b) nucleotide sequences which through degeneracy of the genetic code encode the same peptide as that encoded by the nucleotide sequence of a);
c) the complement of any of a) or b); and
d) nucleotide sequences that hybridize to any of (a-c) under conditions of high stringency;

wherein said peptide exhibits antifungal activity at least that of the peptide as set forth in SEQ ID NO:4.

[c3] 3. The isolated or synthetic nucleic acid molecule of claim 2 being further defined as a RNA molecule.

[c4] 4. A substantially purified polypeptide comprising the amino acid sequence as set forth in SEQ ID NO:4.

- [c5] 5.A recombinant DNA construct comprising a nucleotide sequence encoding a protein comprising the amino acid sequence as set forth in SEQ ID NO:4, said nucleotide sequence being operably linked to a promoter that functions in a host cell to express said protein.
- [c6] 6.The recombinant DNA construct of claim 5 wherein said promoter is selected from the group of promoters consisting of a plant promoter, a bacterial promoter, and a yeast promoter.
- [c7] 7.The recombinant DNA construct of claim 6 wherein said plant promoter is selected from the group of promoters consisting of nopaline synthase (NOS), octopine synthase (OCS), mannopine synthase (mas), cauliflower mosaic virus 19S (CaMV19S), cauliflower mosaic virus 35S (CaMV35S), enhanced CaMV (eCaMV), ribulose 1,5-bisphosphate carboxylase small subunit (ssRUBISCO), figwort mosaic virus (FMV), CaMV35S AS4 enhanced, tobacco RB7, wheat POX1, tobacco EIF-4, lectin protein (Le1), sugarcane bacilliform virus (BADNA), eFMV, MAS, GBOX10, and rice RC2 promoter.
- [c8] 8.The recombinant DNA construct of claim 7, wherein the promoter is seed selective, tissue selective, constitutive, or inducible.

- [c9] 9. The recombinant DNA construct of claim 5, further comprising a selectable marker.
- [c10] 10. The recombinant DNA construct of claim 9, wherein the selectable marker is a nucleotide sequence encoding a protein selected from the group consisting of a kanamycin resistance marker, a hygromycin resistance marker, and a herbicide resistance marker.
- [c11] 11. A recombinant host cell comprising the recombinant DNA construct of claim 5, wherein said host cell is selected from the group consisting of a bacterial cell, a fungal cell, and a plant cell.
- [c12] 12. The recombinant host cell of claim 11 wherein said plant cell is selected from the group consisting of an *Acacia*, alfalfa, aneth, apple, apricot, artichoke, arugula, asparagus, avocado, banana, barley, beans, beet, blackberry, blueberry, broccoli, brussels sprouts, cabbage, canola, cantaloupe, carrot, cassava, castorbean, cauliflower, celery, cherry, chicory, cilantro, citrus, clementines, clover, coconut, coffee, corn, cotton, cucumber, Douglas fir, eggplant, endive, escarole, eucalyptus, fennel, figs, garlic, gourd, grape, grapefruit, honey dew, jicama, kiwifruit, lettuce, leeks, lemon, lime, Loblolly pine, linseed, mango, melon, mushroom, nec-

tarine, nut, oat, oil palm, oil seed rape, okra, olive, onion, orange, an ornamental plant, palm, papaya, parsley, parsnip, pea, peach, peanut, pear, pepper, persimmon, pine, pineapple, plantain, plum, pomegranate, poplar, potato, pumpkin, quince, radiata pine, radicchio, radish, rapeseed, raspberry, rice, rye, sorghum, Southern pine, soybean, spinach, squash, strawberry, sugarbeet, sugarcane, sunflower, sweet potato, sweetgum, tangerine, tea, tobacco, tomato, triticale, turf, turnip, a vine, watermelon, wheat, yams, or zucchini plant.

- [c13] 13. A transgenic plant comprising a nucleotide sequence encoding the antifungal protein as set forth in SEQ ID NO:4.
- [c14] 14. Progeny, seed, or tissue from the plant as set forth in Claim 13, wherein said progeny, seed, or tissue comprise said nucleotide sequence.
- [c15] 15. The transgenic plant of claim 13, wherein the transgenic plant is an *Acacia*, alfalfa, aneth, apple, apricot, artichoke, arugula, asparagus, avocado, banana, barley, beans, beet, blackberry, blueberry, broccoli, brussels sprouts, cabbage, canola, cantaloupe, carrot, cassava, castorbean, cauliflower, celery, cherry, chicory, cilantro, citrus, clementines, clover, coconut, coffee, corn, cotton, cucumber, Douglas fir, eggplant, endive, escarole, euca-

lyptus, fennel, figs, garlic, gourd, grape, grapefruit, honey dew, jicama, kiwifruit, lettuce, leeks, lemon, lime, Loblolly pine, linseed, mango, melon, mushroom, nectarine, nut, oat, oil palm, oil seed rape, okra, olive, onion, orange, an ornamental plant, palm, papaya, parsley, parsnip, pea, peach, peanut, pear, pepper, persimmon, pine, pineapple, plantain, plum, pomegranate, poplar, potato, pumpkin, quince, radiata pine, radicchio, radish, rapeseed, raspberry, rice, rye, sorghum, Southern pine, soybean, spinach, squash, strawberry, sugarbeet, sugarcane, sunflower, sweet potato, sweetgum, tangerine, tea, tobacco, tomato, triticale, turf, turnip, a vine, watermelon, wheat, yams, or zucchini plant.

[c16] 16. A method for preparing a transgenic plant comprising:

- a) selecting a host plant cell for transformation;
- b) transforming the host plant cell with a nucleic acid sequence that encodes an antifungal protein as set forth in SEQ ID NO:4;
- c) obtaining a transformed plant cell comprising said sequence; and
- d) regenerating a transgenic plant from the transformed plant cell,

wherein said transgenic plant is more resistant to fungal pathogens relative to a non-transgenic plant of the same

species.

- [c17] 17. The method of claim 16, wherein the nucleic acid sequence comprises SEQ ID NO:3 or hybridizes under stringent conditions to SEQ ID NO:3, or to the complement thereof.
- [c18] 18. The method of claim 17, wherein the nucleic acid sequence is a synthetic nucleic acid sequence.
- [c19] 19. The method of claim 17, wherein the fungal pathogens comprise *Phytophthora infestans*, *Fusarium graminearum*, *Fusarium moniliforme*, *Verticillium dahliae* and *Stagnospora nodorum*.
- [c20] 20. The method of claim 16, wherein the host plant cell is selected from the group consisting of an *Acacia*, alfalfa, aneth, apple, apricot, artichoke, arugula, asparagus, avocado, banana, barley, beans, beet, blackberry, blueberry, broccoli, brussels sprouts, cabbage, canola, cantaloupe, carrot, cassava, castorbean, cauliflower, celery, cherry, chicory, cilantro, citrus, clementines, clover, coconut, coffee, corn, cotton, cucumber, Douglas fir, eggplant, endive, escarole, eucalyptus, fennel, figs, garlic, gourd, grape, grapefruit, honey dew, jicama, kiwifruit, lettuce, leeks, lemon, lime, Loblolly pine, linseed, mango, melon, mushroom, nectarine, nut, oat, oil palm,

oil seed rape, okra, olive, onion, orange, an ornamental plant, palm, papaya, parsley, parsnip, pea, peach, peanut, pear, pepper, persimmon, pine, pineapple, plantain, plum, pomegranate, poplar, potato, pumpkin, quince, radiata pine, radicchio, radish, rapeseed, raspberry, rice, rye, sorghum, Southern pine, soybean, spinach, squash, strawberry, sugarbeet, sugarcane, sunflower, sweet potato, sweetgum, tangerine, tea, tobacco, tomato, triticale, turf, turnip, a vine, watermelon, wheat, yams, or zucchini plant cell.

- [c21] 21. A composition comprising a polypeptide and a solvent, wherein said polypeptide comprises SEQ ID NO:4, and wherein the composition inhibits the growth of a plant pathogenic fungus.
- [c22] 22. The composition of claim 21 wherein said plant pathogenic fungus comprises *Phytophthora infestans*, *Fusarium graminearum*, *Fusarium moniliforme*, *Verticillium dahliae* or *Stagnospora nodorum*.
- [c23] 23. A method of inhibiting the growth of a plant pathogenic fungus, wherein said method comprising providing to a plant an antifungal effective amount of a polypeptide comprising SEQ ID NO:4.
- [c24] 24. The method of claim 23, wherein the plant is an *Aca-*

cia, alfalfa, aneth, apple, apricot, artichoke, arugula, asparagus, avocado, banana, barley, beans, beet, blackberry, blueberry, broccoli, brussels sprouts, cabbage, canola, cantaloupe, carrot, cassava, castorbean, cauliflower, celery, cherry, chicory, cilantro, citrus, clementines, clover, coconut, coffee, corn, cotton, cucumber, Douglas fir, eggplant, endive, escarole, eucalyptus, fennel, figs, garlic, gourd, grape, grapefruit, honey dew, jicama, kiwifruit, lettuce, leeks, lemon, lime, Loblolly pine, linseed, mango, melon, mushroom, nectarine, nut, oat, oil palm, oil seed rape, okra, olive, onion, orange, an ornamental plant, palm, papaya, parsley, parsnip, pea, peach, peanut, pear, pepper, persimmon, pine, pineapple, plantain, plum, pomegranate, poplar, potato, pumpkin, quince, radiata pine, radicchio, radish, rapeseed, raspberry, rice, rye, sorghum, Southern pine, soybean, spinach, squash, strawberry, sugarbeet, sugarcane, sunflower, sweet potato, sweetgum, tangerine, tea, tobacco, tomato, triticale, turf, turnip, a vine, watermelon, wheat, yams, or zucchini plant.